

STUDIES ON THE STATUS AND CONSERVATION OF *FREREA INDICA* DALZ¹

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(With four plates and two text-figures)

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Frerea indica Dalz. has been identified as one of the twelve most endangered plant species by International Union for Conservation of Nature and Natural Resources (IUCN). A low herbaceous perennial, *F. indica* is reported from only six localities in Maharashtra state. All these known habitats hold a few individuals. This paper gives details of research studies carried out in order to understand and save the plant in the wild and under nursery conditions.

The species has been propagated through vegetative cuttings and seeds. About 500 individuals have been reared under nursery conditions in order to save the plant from extinction. Variation in the striation patterns of the corolla indicate cross pollination. During the study pollinators were identified. Various forms of threats including pests have also been discussed.

INTRODUCTION

A new monotypic genus *Frerea indica* Dalz. (Family: Asclepiadaceae) was reported from the hills near Heware in Junnar taluka by Dalzell (1865). The generic name *Frerea* was derived by Dalzell in memory of Sir Henry Bartle Frere, the then Ex-Governor of Bombay Presidency, as a mark of respect and for promoting scientific research in India. The genus is closely related to *Caralluma fimbriata* Wall. and often wrongly identified as the latter (Bent, 1975). Extended distribution was reported later by Woodrow (1898) from the nearby hill fort Shivneri. Eighty six years later the same species was reported by Santapau (1951a, 1951b) from the neighbouring district of Satara. The locality was again a steep hill slope of Vazirgarh, a small supporting fort adjoining Purandhar hill fort (Santapau and Irani, 1960). An intensive search in the neighbouring areas further revealed only two localities, again on the cliffs of Sajjangad in the same district (Kumbhojkar *et al.*,

1993) and Shivtharghal in the Raigad district (Kothari & Murthy, 1994). The natural distribution of *F. indica* is known to lie between these six localities in three districts of Maharashtra State (Table 1). Each of these habitats shelter fewer individuals.

MATERIAL AND METHODS

Habit, habitat, association and geographical studies were carried out in the natural habitat. Seeds collected from the Sajjangad hill slopes of Maharashtra were sown in Naoroji Godrej Centre for Plant Research (NGCPR) nursery at Shindewadi. Well grown and mature plants were studied for morphological characters with a view to formulate a precise conservation strategy. Extensive studies were carried out on the following aspects: i) Ecological and pollination studies, ii) propagation methods - sexual and vegetative, iii) pests and diseases and their management.

Habit

In the wild, *F. indica* grows on rock crevices of hill cliffs (Plate 1a). The species grows between 750 to 1347 m altitude and the hill slopes facing

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TABLE 1
DISTRIBUTION AND REPORT REFERENCE OF
F. INDICA

Locality	District	Nearby town	Distance from Pune (km)	Year	Reference
Avre	Pune	Junnar	85	1865	Dalzell, N.A*
Shivneri	Pune	Junnar	92	1939	McCann, C
Vazirgarh	Pune	Purandhar	55	1951	Santapau, H
Kates point	Satara	Mahabaleshwar	120	1939	Bombay, R. D*
Sajjangad	Satara	Satara	120	1993	Kumbhojkar, M.S. et al
Shivtharghal	Raigad	Mahad	85	1993	Kothari, M.J & S. Murthy

* The species is not recollected from the locality

south-east of north-west directions (Table 2). Rainfall greatly varies in all the six localities.

Population

In the wild, the species is represented by few individuals, either concentrated in one spot as in the case of Purandhar and Sajjangad or a few spots in the case of Shivneri. The number of spots, number of individuals/population, size of the habitat and area occupied by *F. indica* is presented in Table 3.

About rarity

McCann (1939) considered *F. indica* as an elusive rare plant which in appearance resembled a miniature *Euphorbia neriifolia*. Opinions differ about the rarity of the species. Santapau (1951a) who reported this plant from Vazirgarh, believed that it

is "not so rare as it appears". Due to small population size, the nature of habitat and palaeo-endemism, the species has been listed as endangered (Nayar and Sastry, 1987) and threatened (Jain and Sastry, 1980). Ahmedullah and Nayar (1986) believed that poor follicle formation in the wild is due to the extinction of pollinators. Moreover, IUCN declared *F. indica* as one of the twelve most endangered plants on earth. Such a situation prompted us to take up these studies, to understand its requirements and find out various strategies for saving the species. This paper gives details of the work done at NGCPR farm, Shindewadi.

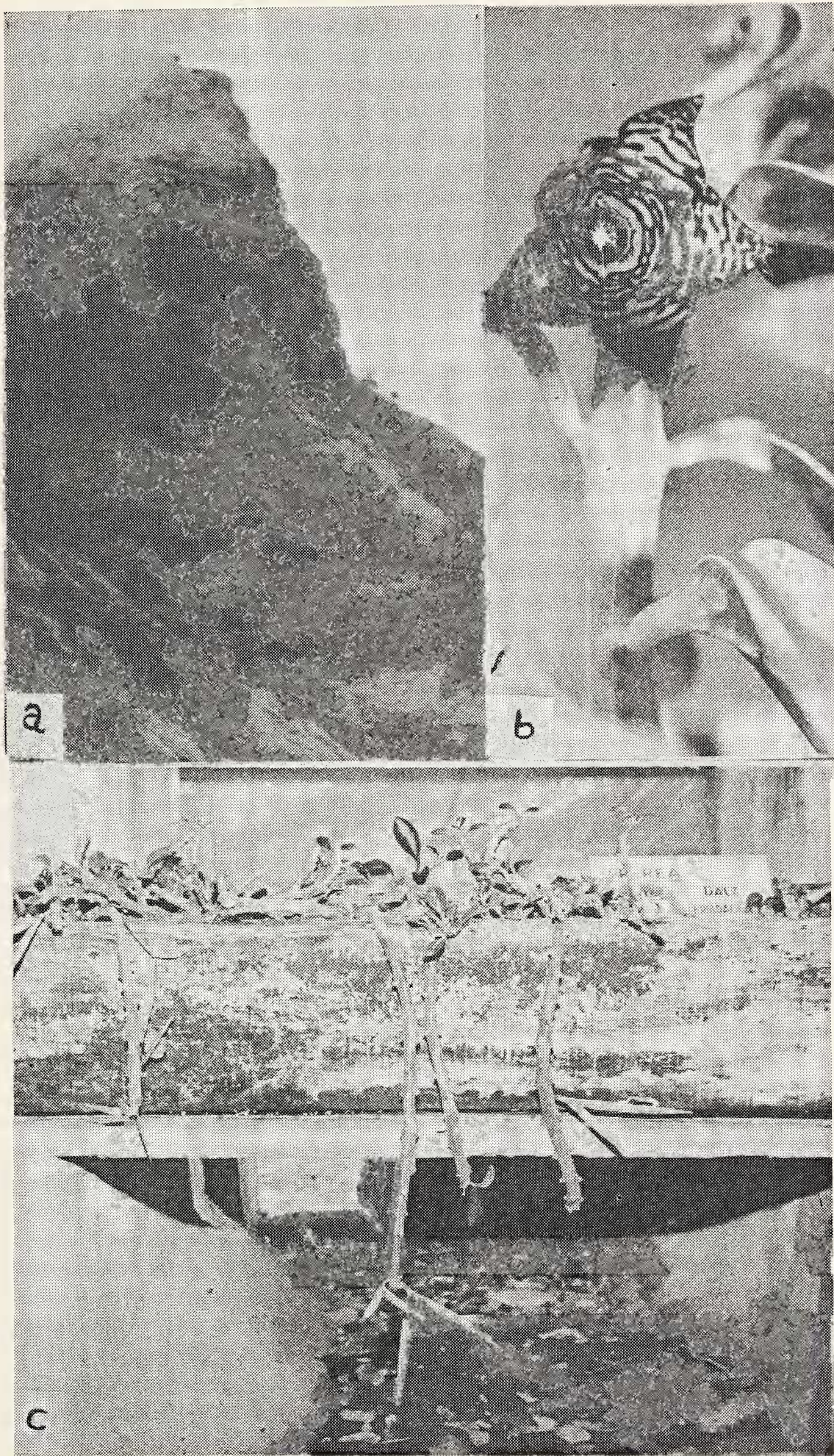
OBSERVATION AND DISCUSSION

F. indica is a fleshy, glabrous perennial. Branches spread on barren rocks and form patches of more than one metre across, or they may droop

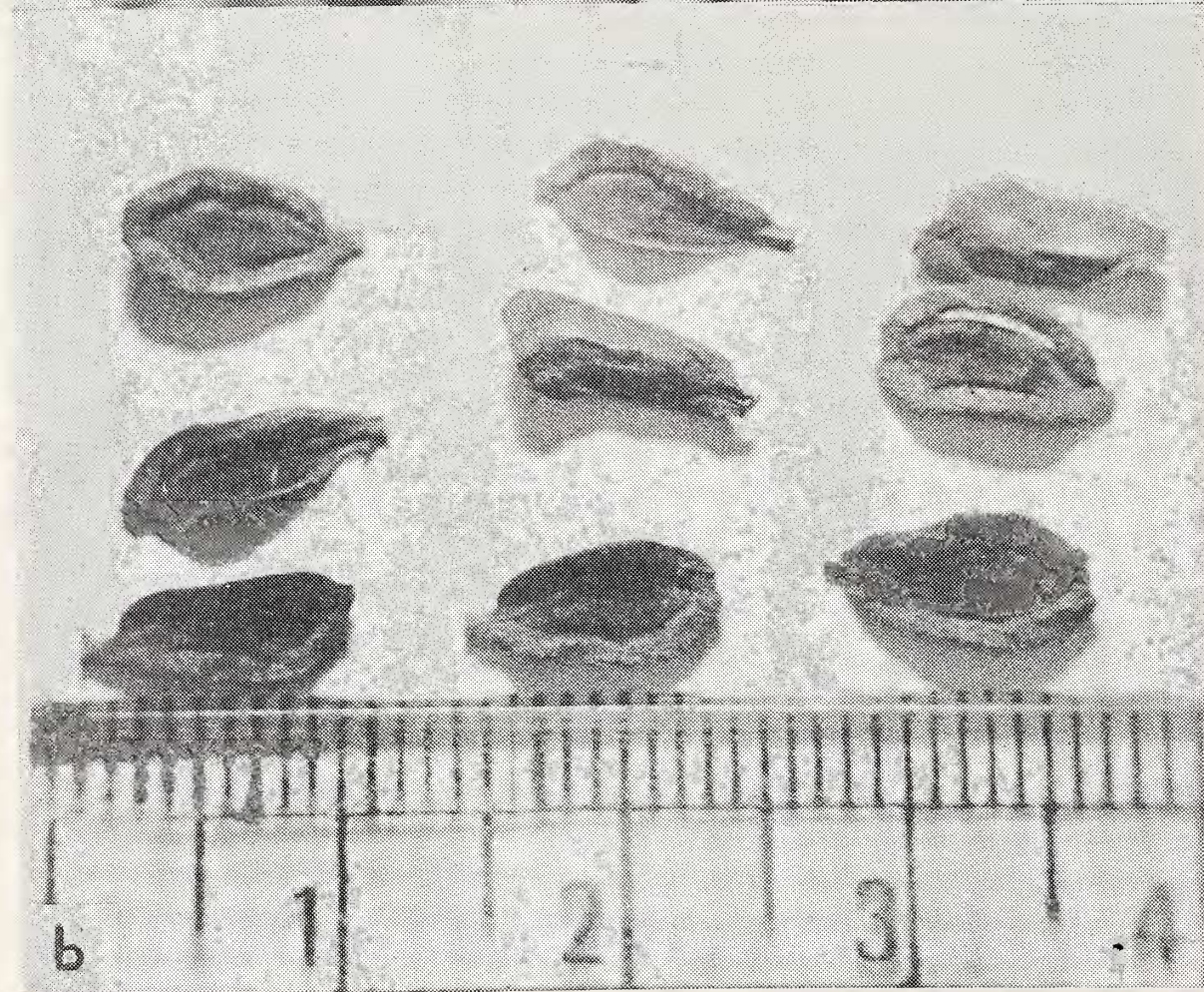
TABLE 2
PHYTOGEOGRAPHY OF *F. INDICA*

Locality	Latitude		Altitude (m)	Rainfall (cm)	Direction *
	N	E			
Awre	19° 12'	73° 52'	914m	72.025	
Shivneri	19° 12'	73° 52'	1018m	72.025	South-East facing
Kates point	17° 55'	73° 35'	1438m	675.640	— —
Vazirgarh	18° 17'	74° 20'	1347m	256.250	North-West facing
Sajjangad	17° 35'	74° 35'	670	-	South-East facing
Shivtharghal	17° 40'	74° 15'	-	319.020	— —

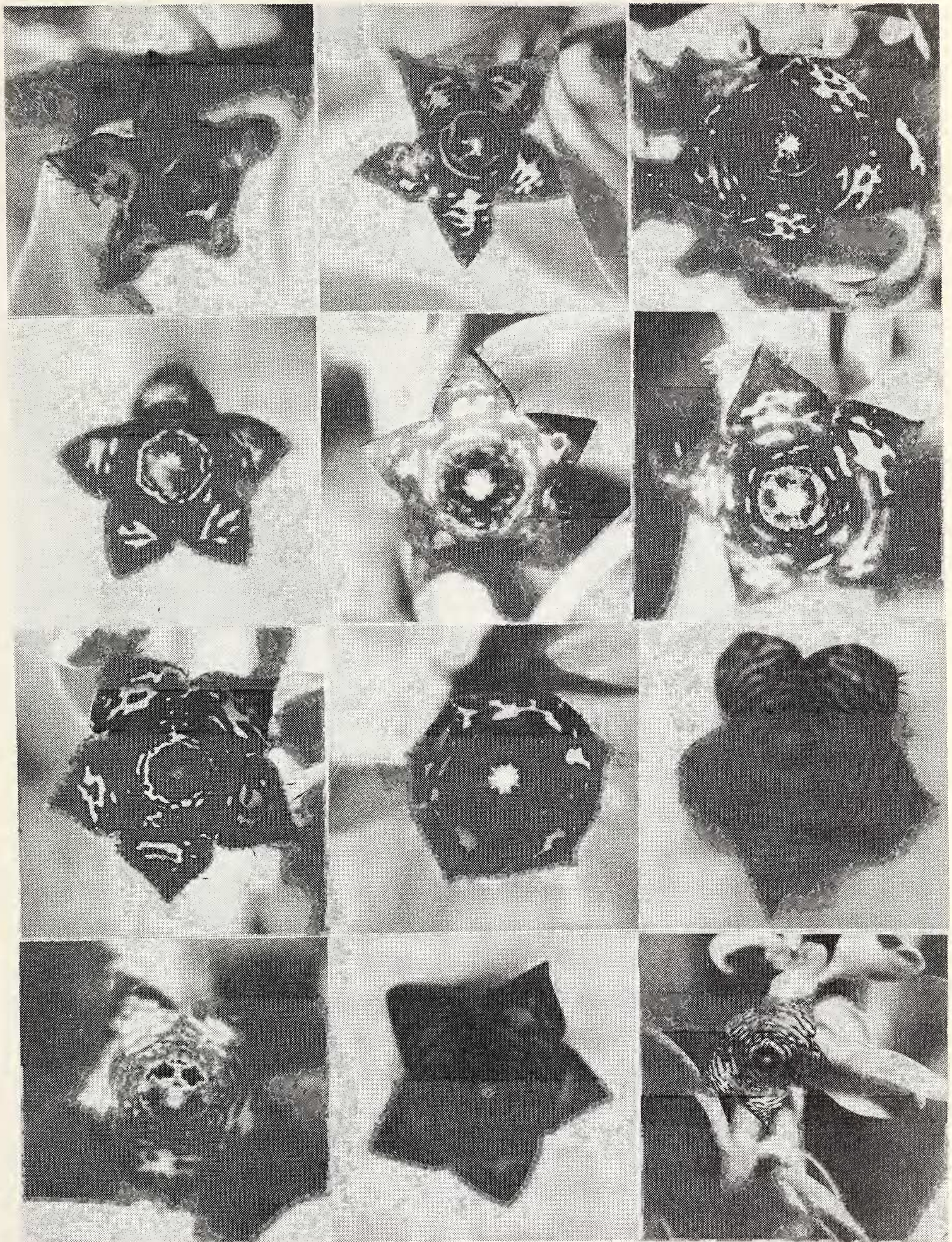
* Direction of hill slopes on which *F. indica* grew.



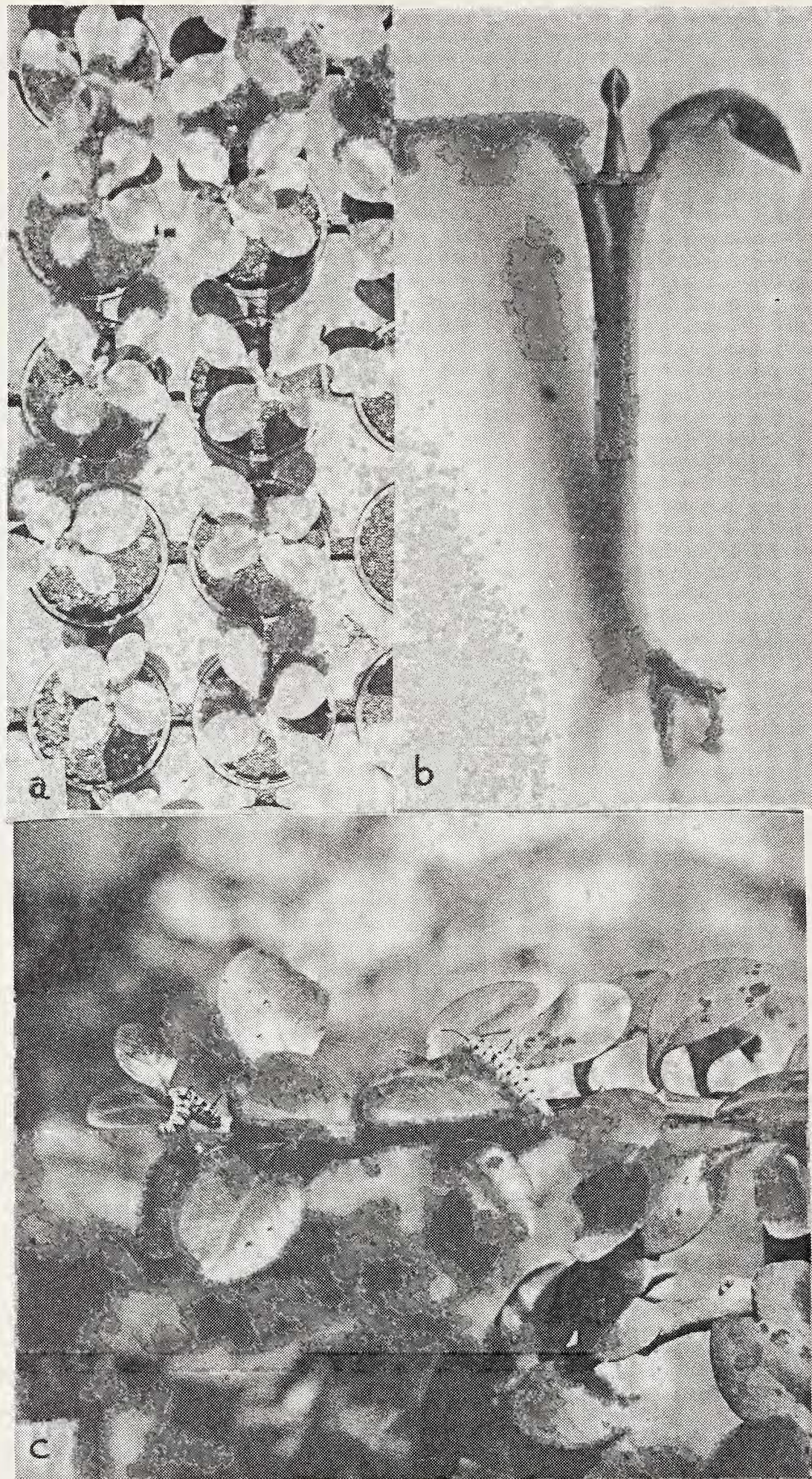
(a) *F. indica* in natural habitat; (b) Plant with solitary flower; (c) Follicle formation.



F. indica (a) Follicles; (b) Seeds.



F. indica variation in corolla striation.



F. indica (a) One month old seedling; (b) Single seedling; (c) Predator - Plain tiger caterpillar.

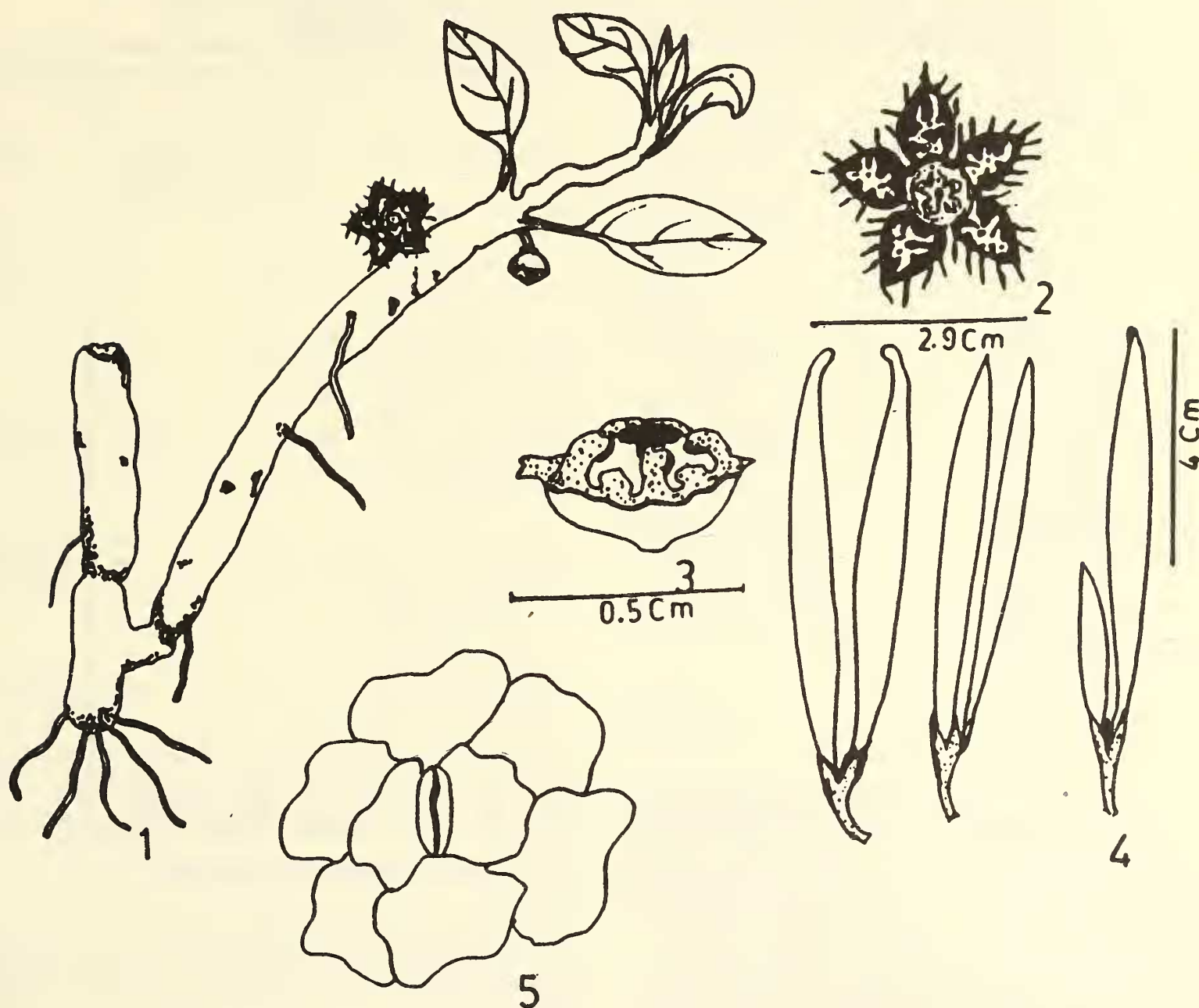


Fig. 1: *F. indica*: (1) Plant. (2) Flower. (3) Pollinia. (4) Follicle variation. (5) Stomata

while clinging to rocks. (Fig. 1 (1)). Fleshy branches under ideal conditions are more than 50 cm in length.

Branches are leafless during winter and summer. During the same period a thin silvery white non-living layer is formed around the stem and branches. Notches slowly appear all over the plant particularly on the connecting places of stems and branches and between new and old branches. With increasing summer intensity, the young branches slowly shrink, fold and turn dirty green in colour. Details of the plant description can be obtained from Hooker (1897) and Cooke (1905). However, the details of morphological characters need further description as additional information was collected

during our studies.

McCann (1939) in a special note described the flower colour. The description is quoted below.

“Dalzell describes the flowers as purple, etc. It has been my experience that newly opened flowers are reticulated with bands of greenish-yellow and dull red-purple; with age both tints intensify, the former becomes yellow and the latter a richer red purple. The yellow then fades out and the entire flower assumes a deep red (almost black) purple. However, no two flowers are alike in colour.”

As per our studies, unlike McCann's observations, the flowers do not change striation formation or turn to deep purple before fading.